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Drinking Water Surveillance Program

ST. CATHARINES WATER TREATMENT PLANT

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Annual Report 1987

Environment Ontario
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ST. CATHARINES
WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1987

ONTARIO MINISTRY OF ENVIRONMENT
OCTOBER 1988

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ACKNOWLEDGEMENTS

The Drinking Water Surveillance Program (DWSP) employs a team approach requiring the co-operative effort of the Ministry of the Environment (MOE) staff from Water Resources and Laboratory Services Branch and the Regions, as well as plant operational staff from the Municipalities.

This annual report was produced by the DWSP Group (Ron Hunsinger, Peter Bohm, Carol Sackville-Duyvelshoff, Chris Fung and John McGrachan) and by Pat Lachmaniuk (on developmental assignment to the Drinking Water Section). Helpful input and reviews were received from Drinking Water Section Staff, in addition to reviews by other MOE and municipal personnel.

EXECUTIVE SUMMARY
DRINKING WATER SURVEILLANCE PROGRAM

ST. CATHARINES WATER TREATMENT PLANT
1987 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored.

The St. Catharines Water Treatment Plant is a conventional treatment plant which treats water from Lake Erie via the Welland Canal. The treatment process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant serves a population of approximately 148,300 people and has a design capacity of 191 x 1000m3/day.

Water samples from the raw, treated and two distribution system sites were taken on a monthly basis. Sampling at both distribution system sites was initiated in February 1987. The plant was incorporated onto the program in May when installation of sample lines was completed. The St. Catharines Water Treatment Plant was sampled for 160 parameters, 8 times during 1987. Parameters were divided into the following groups: Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organic (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polynuclear Aromatic Hydrocarbons, Specific Pesticides and Volatiles). Chlorophenols and Specific Pesticides were analysed for in June and November only.

A summary of results is shown in Table 1.

Coliforms were present in one water sample from the treated and distribution system Site 1 and in two samples from Site 2. The District Officer was notified on all four occasions. Due to its sampling frequency of once per month, the DWSP is not designed to evaluate all aspects of the bacteriological quality of the water; however routine bacteriological monitoring as outlined in the Ontario Drinking Water Objectives (ODWOs) is carried out by the operating authority. In terms of the limited DWSP bacteriological examination, the water was of good quality.

Inorganic and Physical parameters were below any applicable health related ODWOs.

Of a total of approximately 110 Organic parameters tested for on a monthly basis, none exceeded any known health related guidelines.

Many of the substances analysed for were naturally-occurring or treatment by-products.

During 1987 the DWSP sampling results indicated that the St. Catharines Water Treatment Plant produced good quality water at the plant that was maintained throughout the distribution system.

SOMMAIRE

PROGRAMME DE SURVEILLANCE DE L'EAU POTABLE

STATION D'ÉPURATION DE L'EAU DE ST. CATHARINES
RAPPORT ANNUEL 1987

Le Programme de surveillance de l'eau potable (PSEP) de l'Ontario fournit des informations immédiates, fiables et à jour sur la qualité de l'eau potable. Le PSEP a débuté officiellement en avril 1986. Il est destiné à englober tous les réseaux municipaux d'alimentation en eau de l'Ontario. Actuellement, 44 stations en font partie.

La station d'épuration de St. Catharines est une station classique qui traite l'eau du lac Érié via le canal Welland. Le traitement comporte la coagulation, la floculation, la décantation, la filtration et la désinfection. Cette station dessert une population d'environ 148 300 habitants et a une capacité nominale de 191 x 1 000 m3/jour.

Des prélèvements d'eau brute et d'eau traitée ainsi qu'en deux points du réseau de distribution ont été effectués chaque mois, dès février 1987 dans le dernier cas et dès mai 1987 dans celui de la station, qui a pu être intégrée au programme quand on a eu fini d'installer les lignes d'échantillonnage. Huit fois en 1987, les prélèvements ont été analysés par rapport à 160 paramètres dans les catégories suivantes : bactériologique, inorganique et physique (analyses en laboratoire et sur place, présence de métaux) et organique (composés aromatiques chlorés, chlorophénols, pesticides et BPC, dérivés phénoliques, hydrocarbures aromatiques polynucléaires, pesticides particuliers et composés volatils). Les chlorophénols et les pesticides particuliers n'ont été analysés qu'en juin et en novembre.

Le tableau 1 résume les résultats obtenus.

Des coliformes étaient présents dans un spécimen d'eau traitée, dans un spécimen du site n° 1 et dans deux spécimens du site n° 2. L'agent de district a été avisé les quatre fois. En raison de la fréquence des prélèvements (un par mois), le PSEP ne permet pas d'évaluer tous les aspects de la qualité bactériologique de l'eau. Cependant, comme on le recommande dans le cadre des objectifs relatifs à la qualité de l'eau potable en Ontario, un contrôle bactériologique est effectué par l'exploitant. L'analyse bactériologique limitée du PSEP a révélé une eau de bonne qualité.

Les mesures des paramètres inorganiques et physiques étaient inférieures aux limites applicables fixées par l'Ontario pour l'eau potable.

Pour environ 110 paramètres organiques mesurés chaque mois, aucun résultat n'a dépassé les limites acceptables fixées pour la santé.

Un grand nombre de substances détectées apparaissent naturellement ou sont des produits dérivés de l'épuration.

.../2

Les résultats des analyses effectuées en 1987 dans le cadre du PSEP ont indiqué que la station d'épuration de St. Catharines donnait une eau de bonne qualité et que cette qualité se maintenait dans tout le réseau de distribution.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE BY SCAN (1987)

	RAW			TREATED			SITE 1			SITE 2		
SCAN	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	28	28	100	36	15	41	47	13	27	52	19	36
CHEMISTRY (FLD)	24	24	100	45	45	100	110	110	100	115	115	100
CHEMISTRY (LAB)	152	134	88	152	108	71	361	301	83	361	290	80
METALS	160	88	55	160	79	49	391	210	53	401	219	54
CHLOROAROMATICS	104	0	0	104	0	0	143	0	0	143	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	51	0	0	51	0	0	.	.	.	.	.	.
PESTICIDES & PCB	197	0	0	198	0	0	271	0	0	271	0	0
PHENOLICS	8	0	0	8	0	0	.	.	.	.	.	.
SPECIFIC PESTICIDES	117	0	0	117	0	0	90	0	0	90	0	0
VOLATILES	196	0	0	224	32	14	310	46	14	280	41	14
OTAL	1049	274		1107	279		1723	680		1713	684	

COLIFORMS WERE PRESENT IN ONE TREATED WATER AND THREE DISTRIBUTED WATERS NO OTHER HEALTH RELATED GUIDELINES/LIMITS WERE EXCEEDED.

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

ST. CATHARINES WATER TREATMENT PLANT
1987 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. Currently, 44 plants are being monitored. Appendix A contains a detailed description of the DWSP.

The DWSP was initiated at the St. Catharines Water Treatment Plant in the spring of 1987.

This report contains information and results for 1987.

PLANT DESCRIPTION

The St. Catharines Water Treatment is a conventional treatment plant which treats water from Lake Erie via the Welland Canal. This treatment process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant serves a population of approximately 148,300 people. It has a design capacity of 191.0 1000m3/day and daily flows ranging from 86.6 x 1000m3/day to 182.1 1000m3/day.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

METHODS

Water samples were obtained from four DWSP approved locations;

i) Raw - The water originated from the screen well prior to chlorination and was sampled through a stainless steel sample line. The sample tap is located in the screen room.

ii) Treated - The water originated from the 54" main heading to the distribution system after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located in the old chlorine room.

iii) Distribution System - Site 1 - This house is approximately 4 kilometers from the plant. Water was sampled, through copper plumbing, from the basement laundry tap.

iv) Distribution System - Site 2 - This house is approximately 8 kilometers from the plant. Water was sampled, through copper plumbing, from the basement laundry tap.

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

SITE LOCATION MAP

LOCATION: ST CATHARINES WATER TREATMENT PLANT

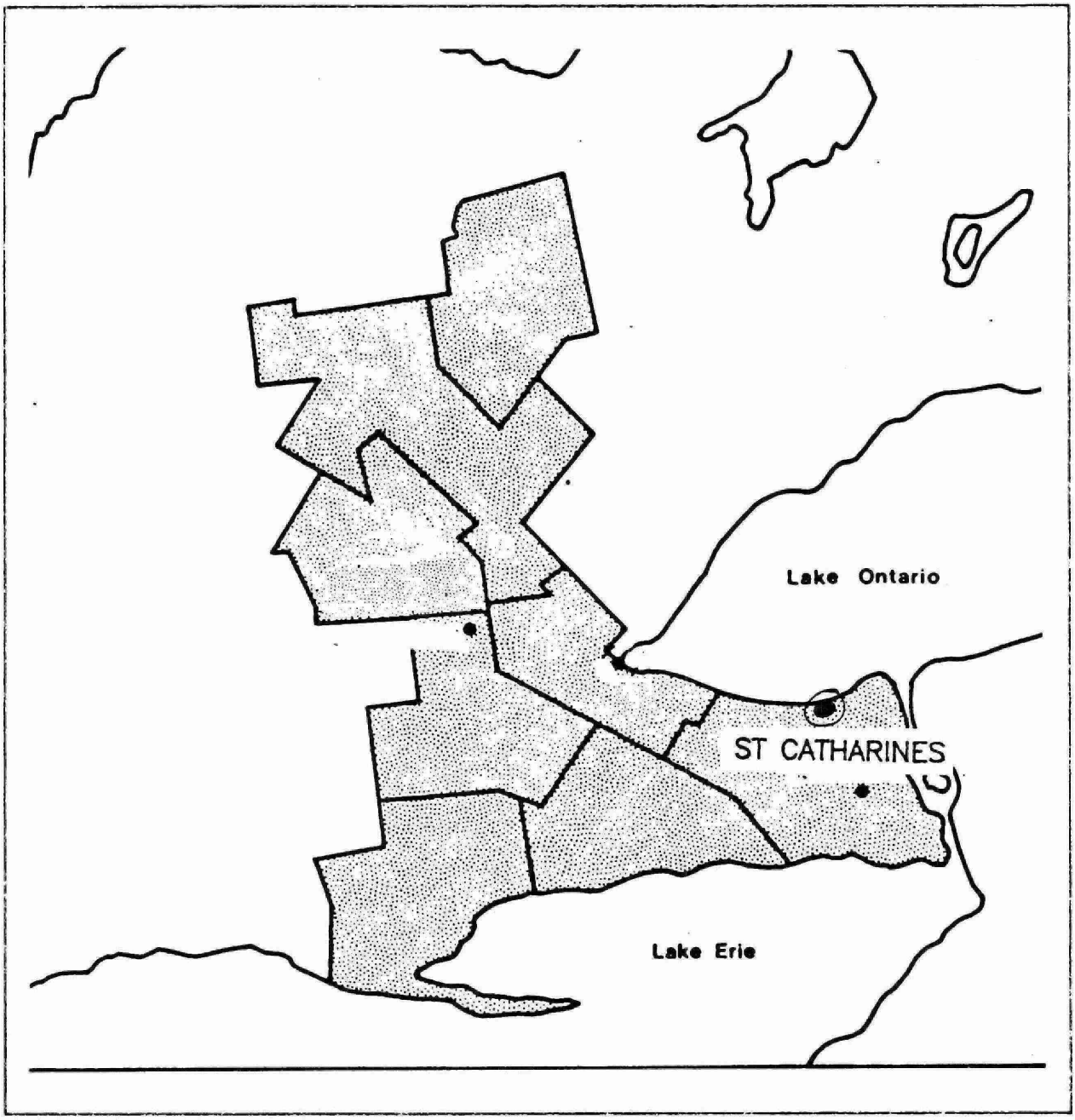


FIGURE 2

ST. CATHARINES WATER TREATMENT PLANT

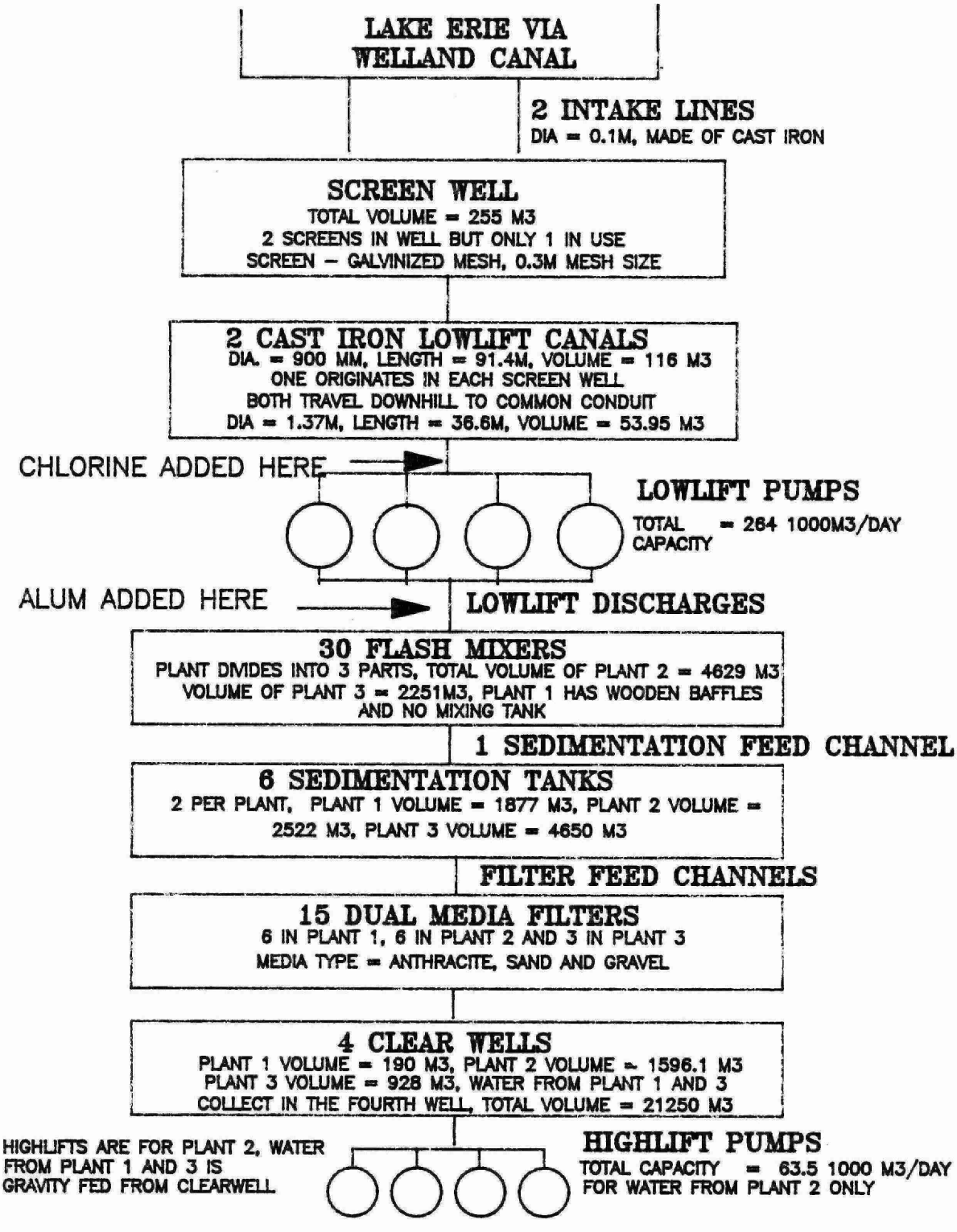


TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

ST. CATHARINES WATER TREATMENT PLANT

LOCATION:	R.R. 1 FONTHILL, ONTARIO L0S 1E0 (416-684-5353)
SOURCE:	RAW WATER SOURCE - LAKE ERIE VIA WELLAND CANAL
RATED CAPACITY:	191 (1000 M3/DAY)
OPERATION:	MUNICIPAL
PLANT SUPERINTENDENT:	A. FORBES
MINISTRY REGION:	WEST CENTRAL
DISTRICT OFFICER:	MR. W. JACKMAN

MUNICIPALITY SERVED	POPULATION
ST. CATHARINES	120,883
THOROLD	13,993
NIAGARA ON THE LAKE	10,029
VINELAND	3,375

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to make an assessment of the amount by which the levels of inorganic compounds and metals may be changed on standing, due to leaching from (or deposition on), the plumbing system. The only analysis carried out on these samples therefore, were the General Chemistry and Metals scans. The free flow sample represented fresh water from the distribution main that had been flowing for five minuted before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to eliminate any variance (Appendix B).

Sample day flow, treatment chemical dosages and field measurements such as Turbidity, Chlorine Residuals, pH and Temperature were recorded on the day of sampling and were entered onto the DWSP data base.

RESULTS

The St. Catharines Water Treatment Plant and two distribution system locations were sampled for approximately 160 parameters on a monthly basis. The raw and treated locations were not incorporated onto the program until May, while sampling was initiated at both distribution system sites in February.

The Specific Pesticides and Chlorophenols scans were sampled for in June and November only. Polynuclear Aromatic Hydrocarbons and Phenolics were only analysed for in the raw and treated water at the plant.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analysed for by parameter and by water type. The number of times

that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occcasion.

Table 6 presents parameters not detected.

Associated guidelines and detection limits are also supplied on both tables. Parameters are listed alphabetically within each scan.

DISCUSSION

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters, these are currently under review. When an ODWO is not available guidelines/limits from other agencies are consulted. The Parameters Listing System (PALIS) recently initiated by the MOE catalogues and keeps current over 1750 guidelines for 650 parameters from agencies

throughout the world.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis or confirmation of the presence of a specific contaminant that is repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. **DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.**

Bacteriology

Positive results for the Bacteriology scan were present fifteen times in the treated water, thirteen times in the distribution system Site 1 water and nineteen times in the Site 2 water. In most cases the positive parameters were Standard Plate Count, Total Coliform and/or Total Coliform Background.

Coliforms as determined by the Presence/Absence test were detected once in the treated water and distribution system Site 1 water and twice in the Site 2 water. The District Officer was notified on each occasion. Total Coliforms were detected by the membrane filtration method, three times in the treated water, and once at both distribution sites.

Standard Plate Count is a test used to supplement routine analysis for Coliform bacteria. The limit for Standard Plate Count (at 35°C after 48 hours) in the ODWO is 500 organisms per mL based on a geometric mean of 5 or more samples. High Standard Plate Counts were present in one of the treated water, distribution system Site 1 and Site 2 samples. The high Standard Plate Count may be indicative of a deterioration in conditions in the distribution system. The presence of Coliforms and elevated Standard Plate Counts all occurred during the summer months, when temperatures in the distribution system increased probably resulting in enhanced bacterial growth. Adjustment of the disinfection dosages may be appropriate during warmer weather.

Due to its sampling frequency of once per month, the DWSP is not designed to evalute all aspects of the bacteriological quality of water. Routine bacteriological monitoring as recommended in the ODWOs is carried out by the operating authority. Water from the St. Catharines Water Treatment Plant, in terms of the limited DWSP bacteriological examination, was of good quality.

Inorganic and Physical Parameters

Laboratory and Field Chemistry

The results for the Laboratory Chemistry and Field Chemistry scans were below all applicable health related ODWOs.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other

microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and maintenance of a chlorine residual. The ODWO of 1 Formazin Turbidity Unit (FTU) is only applicable to treated water leaving the plant.

There are ODWOs that are set for parameters which are related to aesthetic quality rather than health. One of these is Organic Nitrogen. Organic Nitrogen is calculated by subtracting the Ammonia (Ammonium Total) value from the Total Kjeldahl Nitrogen value (Nitrogen Tot Kjeld). In a number of treated water samples and distribution system samples Organic Nitrogen values exceeded the aesthetic ODWO of 0.15 mg/L. When Organic Nitrogen exceeds 0.15 mg/l in treated water some taste and odour problems can result.

This guideline is exceeded in most supplies. Based on the information obtained from the DWSP, which generally indicates no problems with this parameter exceedence, the guideline may be modified when the ODWOs are reviewed.

It is desirable that the Temperature of drinking water be less than 15°C; the palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The desired ODWO was exceeded in many of the treated water samples during the summer months.

Metals

The results reported for the Metals scan were all below any applicable health related ODWOs.

Copper, Iron, Manganese and Zinc levels were lower in the treated water as compared to the raw water. This is a result of the treatment process. The addition of Alum as a coagulant to the raw water and the resulting coagulation/settling process has been shown to reduce the levels of most metals.

Copper, Iron and Manganese levels increased in the distribution system as compared to the treated water indicating that these metals were leached from the distribution system mains as the water travelled to each house.

Elevated levels of Copper and Zinc were detected in the standing samples as compared to the free flow distribution samples thus, indicating that these metals were leached from the household plumbing as the water stood overnight.

Mercury levels in the distribution system waters were increasing throughout the year. Over the past year in the DWSP it has been observed that potassium dichromate, used to preserve Mercury samples, has a limited shelf-life and may show false positives for the presence of Mercury. As the preservative deteriorates, Mercury levels appear to increase due to interferences and the preservatives are replaced.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit has been specified. The ODWO indicates that a useful guideline is to maintain a residual below 0.1 mg/L as Al in the water leaving the plant to avoid post precipitation problems. The measure of residual Aluminum in the treated water is important to indicate the efficiency of the treatment process. Aluminum values exceeded the ODWO operational guideline on seven occasions.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that two parameters were detected:

Hexachloroethane

2,4,5 Trichlorotoluene

Hexachloroethane was detected, at trace levels, once in the raw and treated water and three times in the distribtuion system Site 2 water.

2,4,5 Trichlorotoluene was detected, at a trace level, once in the treated water.

Review of these results, along with information from other water supplies on DWSP, would indicate that certain Chloroaromatics appear more frequently in the treated water than in the raw and

almost always only at trace levels. These occurrences could possibly be due to a reaction of chlorine with organics present in the water or in the distribution system.

Chlorophenols

The results of the Chlorophenols scan showed that no Chlorophenols were detected.

Pesticides and PCB (Polychlorinated Biphenyls)

The results of the Pesticides and PCB scan showed that two pesticides were detected:

Alpha BHC

Lindane

Lindane consist of several isomers of BHC (Benzene Hexachloride). Alpha BHC is the isomer predominantly found in water from the Great Lakes Basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected, at trace levels, five times in the raw and treated water and seven times in the distribution system Site 1 water and eight times in the Site 2 water.

Lindane was detected, at trace levels, once in the raw water and twice in the distribution system Site 1 water.

Specific Pesticides

Results of the Specific Pesticides scan showed that one parameter

was detected:

Atrazine

Atrazine was detected at trace levels, once in the distribution system Site 1 water and twice in the Site 2 water.

Phenolics

Phenolics were detected, at trace levels, twice in the raw and treated water. Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes.

Polynuclear Aromatic Hydrocarbons (PAHs)

The results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that three parameters, other than Trihalomethanes(THMs), were detected:

Toluene

Ethylbenzene

1,4 Dichlorobenzene

Toluene was detected, at trace levels, three times in the treated water and twice in the distribution system Site 2 water. Three positive results were detected for Toluene. The October results were due to contamination as indicated by the remark code 'UCS'. The September distribtuion system site 1 sampled contained a positive Toluene value of 0.950 ug/l. This is below the California State Department of Health Drinking Water Guideline

value of 100.00 ug/L. Subsequent to the printing of Table 5, Health and Welfare Canada have published an Aesthetic Objective (AO) for Toluene in drinking water of 24 ug/L. This objective was set based on taste impairment, but only after a review of toxicological data indicated it to be below the level considered to constitute a health hazard.

Ethylbenzene was detected, at trace levels, once in the raw water, twice in the treated water and once in the distribution system Site 1 Site 2 water.

These volatiles are typically found on an occasional basis at other water supplies included on the DWSP usually at trace levels.

1,4-Dichlorobenzene was detected, at a trace level, once in the distribution system Site 2 water.

THMs are acknowledged to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised mainly of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Chlorodibromomethane, Dichlorobromomethane and Total THMs were always detected in the treated water samples and in all distribution system water samples. Bromoform was detected three

times in the treated water, four times in water from distribution system Site 1 and twice in water from Site 2. All THM occurrences were well below the ODWO of 350 ug/l for Total THMs.

CONCLUSIONS

The St. Catharines Water Treatment plant for the sample year of 1987 produced good quality water at the plant and this was maintained throughout the distribution system.

No health related guidelines, for organic or inorganic parameters, were exceeded during 1987.

RECOMMENDATIONS

Three recommendations can be made:

1) The data base should be reviewed in consultation with Regional, Plant and DWSP personnel to determine if sampling location, sampling frequency and the number of parameters analysed could be revised to allow for a more efficient characterization of the water.

2) Adjustment of the disinfection dosages may be appropriate during the summer months.

3) Remote sites (eg. Niagara-on-the-Lake and Vineland) should be added to the distribution system sampling locations.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

	SAMPLE DAY CONDITIONS		TREATMENT CHEMICAL DOSAGES (MG/L)		
			PRE-CHLORINATION	COAGULATION	POST-CHLORINATION
			CHLORINE	ALUM LIQUID	CHLORINE
DATE	RETENTION TIME(HRS)	FLOW (1000 M3)			
FEB 18	3.2	102.4	.70	12.75	.15
MAR 17	9.0	112.3	.70	14.42	.15
APR 21	8.0	115.1	.90	13.62	.15
MAY 19	7.5	111.4	.90	10.67	.25
JUN 15	6.2	170.7	.80	11.52	.28
JUL 20	6.7	135.5	.80	13.27	.30
AUG 17	5.6	150.4	.80	10.41	.33
SEP 22	7.0	112.7	1.00	11.09	.43
OCT 19	7.5	106.2	1.30	10.19	.22
NOV 17	10.2	99.3	1.20	6.91	.18
DEC 15	10.1	100.3	.90	8.43	.12

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
BACTERIOLOGICAL	AEROMONAS SP	0	0	0	1	0	0	1	0	0	2	0	0
	COLIFORM	0	0	0	1	1	0	1	1	0	2	2	0
	ESCHERICHIA COLI BY PRESENCE/ABSENCE	0	0	0	1	0	0	1	0	0	2	0	0
	FECAL COLIFORM	0	0	0	1	0	0	1	0	0	2	0	0
	FECAL COLIFORM MEMBRANE FILTRATION	8	8	0	0	0	0	0	0	0	0	0	0
	P/A BOTTLE	0	0	0	8	1	0	11	1	0	11	2	0
	STANDARD PLATE COUNT MEMBRANE FILT.	4	4	0	7	6	0	9	7	0	9	8	0
	STAPH AUREUS	0	0	0	1	0	0	1	0	0	2	0	0
	TOTAL COLIFORM BACKGROUND MF	8	8	0	8	4	0	11	3	0	11	6	0
	TOTAL COLIFORM MEMBRANE FILTRATION	8	8	0	8	3	0	11	1	0	11	1	0
*TOTAL SCAN BACTERIOLOGICAL		28	28	0	36	15	0	47	13	0	52	19	0
*TOTAL GROUP BACTERIOLOGICAL		28	28	0	36	15	0	47	13	0	52	19	0
CHEMISTRY (FLD)	FIELD COMBINED CHLORINE RESIDUAL	0	0	0	5	5	0	2	2	0	17	17	0
	FIELD FREE CHLORINE RESIDUAL	0	0	0	8	8	0	22	22	0	13	13	0
	FIELD PH	8	8	0	8	8	0	22	22	0	22	22	0
	FIELD TEMPERATURE	8	8	0	8	8	0	22	22	0	22	22	0
	FIELD TOTAL CHLORINE RESIDUAL	0	0	0	8	8	0	22	22	0	19	19	0
	FIELD TURBIDITY	8	8	0	8	8	0	20	20	0	22	22	0
*TOTAL SCAN CHEMISTRY (FLD)		24	24	0	45	45	0	110	110	0	115	115	0
CHEMISTRY (LAB)	ALKALINITY	8	8	0	8	8	0	22	22	0	22	22	0
	AMMONIUM TOTAL	8	6	1	8	4	1	22	3	14	22	3	12

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	#. ANALYSED	POSITIVE	TRACE
CHEMISTRY (LAB)	CALCIUM	8	8	0	8	8	0	22	22	0	22	22	0
	CHLORIDE	8	8	0	8	8	0	22	22	0	22	22	0
	COLOUR	8	4	4	8	1	6	22	14	7	22	3	19
	CONDUCTIVITY	8	8	0	8	8	0	22	22	0	22	22	0
	CYANIDE	8	0	0	8	0	0	9	0	0	9	0	0
	FLUORIDE	8	7	0	8	8	0	22	22	0	22	22	0
	HARDNESS	8	8	0	8	8	0	22	22	0	22	22	0
	MAGNESIUM	8	8	0	8	8	0	22	22	0	22	22	0
	NITRITE	8	6	2	8	0	4	22	0	18	22	1	15
	NITROGEN TOTAL KJELDAHL	8	8	0	8	8	0	22	22	0	22	21	1
	PH	8	8	0	8	8	0	22	22	0	22	22	0
	PHOSPHORUS FIL REACT	8	7	1	8	1	6	0	0	0	0	0	0
	PHOSPHORUS TOTAL	8	8	0	8	0	5	0	0	0	0	0	0
	SODIUM	8	8	0	8	8	0	22	22	0	22	22	0
	TOTAL NITRATES	8	8	0	8	7	1	22	20	2	22	20	2
	TOTAL SOLIDS	8	8	0	8	8	0	22	22	0	22	22	0
	TURBIDITY	8	8	0	8	7	1	22	22	0	22	22	0
*TOTAL SCAN CHEMISTRY (LAB)		152	134	8	152	108	24	361	301	41	361	290	49
METALS	ALUMINUM	8	8	0	8	8	0	20	20	0	20	20	0
	ARSENIC	8	0	0	8	0	0	19	0	0	22	0	0
	BARIUM	8	8	0	8	8	0	20	20	0	20	20	0
	BERYLLIUM	8	0	0	8	0	0	20	0	0	20	0	0
	BORON	8	1	7	8	1	7	20	6	13	22	8	14
	CADMIUM	8	1	0	8	0	0	20	0	0	20	2	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
METALS	CHROMIUM	8	4	0	8	4	0	20	8	0	20	7	0
	COBALT	8	0	0	8	1	0	20	2	0	20	0	0
	COPPER	8	8	0	8	4	0	20	19	0	20	20	0
	CYANIDE	0	0	0	0	0	0	2	0	0	2	0	0
	IRON	8	8	0	8	4	0	20	19	0	20	20	0
	LEAD	8	0	0	8	1	0	20	6	0	20	7	0
	MANGANESE	8	8	0	8	8	0	20	20	0	20	20	0
	MERCURY	8	7	0	8	6	0	11	10	0	11	8	0
	MOLYBDENUM	8	1	0	8	8	0	20	7	0	20	10	0
	NICKEL	8	5	0	8	4	0	20	13	0	20	13	0
	SELENIUM	8	0	0	8	0	0	19	0	0	22	0	0
	STRONTIUM	8	8	0	8	8	0	20	20	0	20	20	0
	URANIUM	8	8	0	8	8	0	20	20	0	22	22	0
	VANADIUM	8	5	0	8	1	0	20	5	0	20	5	0
	ZINC	8	8	0	8	5	0	20	15	0	20	17	0
*TOTAL SCAN METALS		160	88	7	160	79	7	391	210	13	401	219	14
*TOTAL GROUP INORGANIC & PHYSICAL		336	246	15	357	232	31	862	621	54	877	624	63
CHLOROAROMATICS	123 TRICHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	1234 TETRACHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	1235 TETRACHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	124 TRICHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	1245 TETRACHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	135 TRICHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	236 TRICHLOROTOLUENE	8	0	0	8	0	0	11	0	0	11	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
CHLOROAROMATICS	245 TRICHLOROTOLUENE	8	0	0	8	0	1	11	0	0	11	0	0
	26A TRICHLOROTOLUENE	8	0	0	8	0	0	11	0	0	11	0	0
	HEXACHLOROBUTADIENE	8	0	0	8	0	0	11	0	0	11	0	0
	HEXACHLOROETHANE	8	0	1	8	0	1	11	0	0	11	0	3
	OCTACHLOROSTYRENE	8	0	0	8	0	0	11	0	0	11	0	0
	PENTACHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
*TOTAL SCAN CHLOROAROMATICS		104	0	1	104	0	2	143	0	0	143	0	3
CHLOROPHENOLS	234 TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2345 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	2356 TETRACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	245-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	246-TRICHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
	PENTACHLOROPHENOL	2	0	0	2	0	0	0	0	0	0	0	0
*TOTAL SCAN CHLOROPHENOLS		12	0	0	12	0	0	0	0	0	0	0	0
PAH	ANTHANTHRENE	0	0	0	0	0	0	0	0	0	0	0	0
	ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(A) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO (A) PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(B) CHRYSENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(B) FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(E)PYRENE	3	0	0	3	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
PAH	BENZO(G,H,I) PERYLENE	3	0	0	3	0	0	0	0	0	0	0	0
	BENZO(J) FLUORANTHENE	0	0	0	0	0	0	0	0	0	0	0	0
	BENZO(K) FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	CHRYSENE	3	0	0	3	0	0	0	0	0	0	0	0
	CORONENE	3	0	0	3	0	0	0	0	0	0	0	0
	DIBENZO(A,H) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	DIMETHYL BENZO(A) ANTHRACENE	3	0	0	3	0	0	0	0	0	0	0	0
	FLUORANTHENE	3	0	0	3	0	0	0	0	0	0	0	0
	INDENO(1,2,3-C,D) PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
	PERYLENE	3	0	0	3	0	0	0	0	0	0	0	0
	PHENANTHRENE	3	0	0	3	0	0	0	0	0	0	0	0
	PYRENE	3	0	0	3	0	0	0	0	0	0	0	0
*TOTAL SCAN PAH		51	0	0	51	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALACHLOR	7	0	0	7	0	0	10	0	0	10	0	0
	ALDRIN	8	0	0	8	0	0	11	0	0	11	0	0
	ALPHA BHC	8	0	5	8	0	5	11	0	7	11	0	8
	ALPHA CHLORDANE	8	0	0	8	0	0	11	0	0	11	0	0
	ATRATONE	7	0	0	7	0	0	10	0	0	10	0	0
	BETA BHC	8	0	0	8	0	0	11	0	0	11	0	0
	DIELDRIN	8	0	0	8	0	0	11	0	0	11	0	0
	ENDRIN	8	0	0	8	0	0	11	0	0	11	0	0
	ETHLYENE DIBROMIDE	7	0	0	8	0	0	9	0	0	9	0	0
	GAMMA CHLORDANE	8	0	0	8	0	0	11	0	0	11	0	0
	HEPTACHLOR	8	0	0	8	0	0	11	0	0	11	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

SCAN	PARAMETER	RAW WATER # ANALYSED	RAW WATER POSITIVE	RAW WATER TRACE	TREATED WATER # ANALYSED	TREATED WATER POSITIVE	TREATED WATER TRACE	SITE 1 # ANALYSED	SITE 1 POSITIVE	SITE 1 TRACE	SITE 2 # ANALYSED	SITE 2 POSITIVE	SITE 2 TRACE
PESTICIDES & PCB	HEPTACHLOR EPOXIDE	8	0	0	8	0	0	11	0	0	11	0	0
	HEXACHLOROBENZENE	8	0	0	8	0	0	11	0	0	11	0	0
	LINDANE	8	0	1	8	0	0	11	0	2	11	0	0
	METHOXYCHLOR	8	0	0	8	0	0	11	0	0	11	0	0
	MIREX	8	0	0	8	0	0	11	0	0	11	0	0
	O,P-DDT	8	0	0	8	0	0	11	0	0	11	0	0
	OXYCHLORDANE	8	0	0	8	0	0	11	0	0	11	0	0
	PCB	8	0	0	8	0	0	11	0	0	11	0	0
	PP-DDD	8	0	0	8	0	0	11	0	0	11	0	0
	PPDDE	8	0	0	8	0	0	11	0	0	11	0	0
	PPDDT	8	0	0	8	0	0	11	0	0	11	0	0
	THIODAN I	8	0	0	8	0	0	11	0	0	11	0	0
	THIODAN II	8	0	0	8	0	0	11	0	0	11	0	0
	THIODAN SULPHATE	8	0	0	8	0	0	11	0	0	11	0	0
*TOTAL SCAN PESTICIDES & PCB		197	0	6	198	0	5	271	0	9	271	0	8
PHENOLICS		8	0	2	8	0	2	0	0	0	0	0	0
*TOTAL SCAN PHENOLICS		8	0	2	8	0	2	0	0	0	0	0	0
SPECIFIC PESTICIDES		2	0	0	2	0	0	0	0	0	0	0	0
	2,4 D PROPIONIC ACID	2	0	0	2	0	0	0	0	0	0	0	0
	2,4,5-T	2	0	0	2	0	0	0	0	0	0	0	0
	2,4-D	2	0	0	2	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
SPECIFIC PESTICIDES	24-DICHLORORPHENOXYBUTYRIC	2	0	0	2	0	0	0	0	0	0	0	0
	AMETRYNE	7	0	0	7	0	0	10	0	0	10	0	0
	AMINOCARB	0	0	0	0	0	0	0	0	0	0	0	0
	ATRAZINE	7	0	0	7	0	0	10	0	1	10	0	2
	BENOMYL	0	0	0	0	0	0	0	0	0	0	0	0
	BLADEX	7	0	0	7	0	0	10	0	0	10	0	0
	BUX (METALKAMATE)	2	0	0	2	0	0	0	0	0	0	0	0
	CARBOFURAN	2	0	0	2	0	0	0	0	0	0	0	0
	DIALLATE	2	0	0	2	0	0	0	0	0	0	0	0
	DIAZINON	2	0	0	2	0	0	0	0	0	0	0	0
	DICAMBA	2	0	0	2	0	0	0	0	0	0	0	0
	DICHLOROVOS	2	0	0	2	0	0	0	0	0	0	0	0
	DURSBAN	2	0	0	2	0	0	0	0	0	0	0	0
	EPTAM	2	0	0	2	0	0	0	0	0	0	0	0
	ETHION	2	0	0	2	0	0	0	0	0	0	0	0
	GUTHION	0	0	0	0	0	0	0	0	0	0	0	0
	IPC	2	0	0	2	0	0	0	0	0	0	0	0
	MALATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYL PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	METHYLTRITHION	2	0	0	2	0	0	0	0	0	0	0	0
	METOLACHLOR	7	0	0	7	0	0	10	0	0	10	0	0
	MEVINPHOS	2	0	0	2	0	0	0	0	0	0	0	0
	PARATHION	2	0	0	2	0	0	0	0	0	0	0	0
	PHORATE (THIMET)	2	0	0	2	0	0	0	0	0	0	0	0
	PICHLORAM	0	0	0	0	0	0	0	0	0	0	0	0
	PROMETONE	7	0	0	7	0	0	10	0	0	10	0	0
	PROMETRYNE	7	0	0	7	0	0	10	0	0	10	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
SPECIFIC PESTICIDES	PROPAZINE	7	0	0	7	0	0	10	0	0	10	0	0
	PROPOXUR	2	0	0	2	0	0	0	0	0	0	0	0
	RELDAN	2	0	0	2	0	0	0	0	0	0	0	0
	RONNEL	2	0	0	2	0	0	0	0	0	0	0	0
	SENCOR	7	0	0	7	0	0	10	0	0	10	0	0
	SEVIN (CARBARYL)	2	0	0	2	0	0	0	0	0	0	0	0
	SILVEX	2	0	0	2	0	0	0	0	0	0	0	0
	SIMAZINE	7	0	0	7	0	0	10	0	0	10	0	0
	SUTAN (BUTYLATE)	2	0	0	2	0	0	0	0	0	0	0	0
	TOXAPHENE	0	0	0	0	0	0	0	0	0	0	0	0
*TOTAL SCAN SPECIFIC PESTICIDES		117	0	0	117	0	0	90	0	1	90	0	2
VOLATILES	1,1 DICHLOROETHANE	7	0	0	8	0	0	11	0	0	10	0	0
	1,1 DICHLOROETHYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	1,2 DICHLOROBENZENE	7	0	0	8	0	0	11	0	0	10	0	0
	1,2 DICHLOROETHANE	7	0	0	8	0	0	11	0	0	10	0	0
	1,2 DICHLOROPROPANE	7	0	0	8	0	0	11	0	0	10	0	0
	1,3 DICHLOROBENZENE	7	0	0	8	0	0	11	0	0	10	0	0
	1,4 DICHLOROBENZENE	7	0	0	8	0	0	11	0	0	10	0	1
	111, TRICHLOROETHANE	7	0	0	8	0	0	11	0	0	10	0	0
	112 TRICHLOROETHANE	7	0	0	8	0	0	11	0	0	10	0	0
	1122 TETRA-CHLOROETHANE	7	0	0	8	0	0	11	0	0	10	0	0
	BENZENE	7	0	0	8	0	0	11	0	0	10	0	0
	BROMOFORM	7	0	0	8	0	3	11	0	4	10	0	2
	CARBON TETRACHLORIDE	7	0	0	8	0	0	11	0	0	10	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT

SUMMARY TABLE OF RESULTS (1987)

		RAW WATER			TREATED WATER			SITE 1			SITE 2		
SCAN	PARAMETER	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE	# ANALYSED	POSITIVE	TRACE
VOLATILES	CHLOROBENZENE	7	0	0	8	0	0	11	0	0	10	0	0
	CHLORODIBROMOMETHANE	7	0	0	8	8	0	11	11	0	10	10	0
	CHLOROFORM	7	0	0	8	8	0	11	11	0	10	10	0
	DICHLOROBROMOMETHANE	7	0	0	8	8	0	11	11	0	10	10	0
	ETHLYENE DIBROMIDE	0	0	0	0	0	0	2	0	0	1	0	0
	ETHYLBENZENE	7	0	1	8	0	2	11	0	1	10	0	1
	M-XYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	METHYLENE CHLORIDE	7	0	0	8	0	0	11	0	0	9	0	0
	O-XYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	P-XYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	TETRACHLOROETHYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	TOLUENE	7	0	0	8	0	3	11	2	0	10	1	2
	TOTAL TRIHALOMETHANES	7	0	0	8	8	0	11	11	0	10	10	0
	TRANS 1,2 DICHLOROETHYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	TRICHLOROETHYLENE	7	0	0	8	0	0	11	0	0	10	0	0
	TRIFLUOROCHLOROTOLUENE	7	0	0	8	0	0	11	0	0	10	0	0
*TOTAL SCAN VOLATILES		196	0	1	224	32	8	310	46	5	280	41	6
*TOTAL GROUP ORGANIC		685	0	10	714	32	17	814	46	15	784	41	19
TOTAL		1049	274	25	1107	279	48	1723	680	69	1713	684	82

KEY TO TABLES 5 AND 6

A ONTARIO DRINKING WATER OBJECTIVES
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
1*. MAC for Bacteriological Analyses
Poor water quality is indicated when :
- total coliform counts > 0 < 5
- P/A Bottle Test is present after 48 hours
- Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
- Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
- Standard Plate Count should not exceed 500 organisms per ml at 35 deg C within 48 hours

2. Interim Maximum Acceptable Concentration (IMAC)
3. Maximum Desirable Concentration (MDC)
4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness >200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.

B HEALTH & WELFARE CANADA
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC

C WORLD HEALTH ORGANIZATION
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

H USSR MAXIMUM PERMISSIBLE CONCENTRATION

I NEW YORK STATE AMBIENT WATER GUIDELINE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!AW	No Data: Analysis Withdrawn
!CR	No Data: Could Not Confirm By Reanalysis
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample

RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
AEROMONAS SP (0=ABSENT)			DET'N LIMIT = N/A	GUIDELINE = 0	(A1)	
JUL	.	0	.	.	.	0
AUG	.	.	.	0	.	0
E. COLI (P/A) (0=ABSENT)			DET'N LIMIT = N/A	GUIDELINE =		
JUL	.	0	.	.	.	0
AUG	.	.	.	0	.	0
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0	(A1)	
MAY	5	.	.	.	.	.
JUN	16	.	.	.	.	.
JUL	8	.	.	.	.	.
AUG	18	.	.	.	.	.
SEP	132	.	.	.	.	.
OCT	5	.	.	.	.	.
NOV	2	.	.	.	.	.
DEC	9	.	.	.	.	.
FECAL COLIFORM (0=ABSENT)			DET'N LIMIT = N/A	GUIDELINE = 0	(A1)	
JUL	.	0	.	.	.	0
AUG	.	.	.	0	.	0
STANDRD PLATE CNT MF (CT/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML	(A1)	
FEB	.	.	.	1	.	0
MAR	.	.	.	1	.	7
APR	.	.	.	16	.	2
MAY	!AW	!AW	.	!AW	.	!AW
JUN	2400 >	360	.	!LA	.	1700
JUL	!OP	2400 >	.	268	.	!OP
AUG	!OP	350	.	600	.	315
SEP	440	130	.	63	.	47
OCT	630	2	.	0	.	3
NOV	!LA	4	.	0	.	4
DEC	350	0	.	6	.	18
P/A BOTTLE (0=ABSENT)			DET'N LIMIT = 0	GUIDELINE = 0	(A1*)	
FEB	.	.	.	0	.	0
MAR	.	.	.	0	.	0
APR	.	.	.	0	.	0
MAY	.	0	.	0	.	0
JUN	.	0	.	0	.	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE TYPE	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	.	1	.	0	.	1
AUG	.	0	.	1	.	1
SEP	.	0	.	0	.	0
OCT	.	0	.	0	.	0
NOV	.	0	.	0	.	0
DEC	.	0	.	0	.	0
STAPH AUREUS (0=ABSENT)			DET'N LIMIT = N/A		GUIDELINE = 0 (A1)	
JUL	.	0	.	.	.	0
AUG	.	.	.	0	.	0
COLIFORM (0=ABSENT)			DET'N LIMIT = N/A		GUIDELINE = 0 (A1)	
JUL	.	1	.	.	.	1
AUG	.	.	.	1	.	1
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)	
FEB	.	.	.	0	.	0
MAR	.	.	.	0	.	0
APR	.	.	.	0	.	0
MAY	22 A3C	0	.	0	.	0
JUN	76 A3C	0	.	0	.	0
JUL	400	4 A3C	.	3	.	1 A3C
AUG	72 A3C	2 A3C	.	0	.	0
SEP	700	1 A3C	.	0	.	0
OCT	64 A3C	0	.	0	.	0
NOV	20	0	.	0	.	0
DEC	1000	0	.	0	.	0
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = N/A	
FEB	.	.	.	0	.	0
MAR	.	.	.	0	.	0
APR	.	.	.	0	.	1
MAY	800	0	.	0	.	0
JUN	2200	1	.	0	.	8
JUL	25200	1090	.	219	.	2400 >
AUG	72000	1200	.	6	.	93
SEP	4000	550	.	3	.	14
OCT	2200	0	.	0	.	10
NOV	450	0	.	0	.	0
DEC	4900	0	.	0	.	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = N/A		GUIDELINE =	N/A
FEB	.	.	.	.	.100	.100
MAR	.	.	.	.	.050	.100
APR	.	.	.	.	.	.050
MAY	.	.090	.	.	.100	.050
JUN	.	.	.010	.010	.050	.050
JUL	.	.100	.	.	.	.050
AUG	.	.	.	.	.100	.100
SEP	.	.150	.	.	.100	.100
OCT	.	.	.	.	.050	.100
NOV	.	.170	.	.	.	.
DEC	.	.110	.	.	.	.100
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = N/A		GUIDELINE =	N/A
FEB	.	.	.100	.100	.100	.100
MAR	.	.	.150	.100	.050	.100
APR	.	.	.100	.100	.	.100
MAY	.	.200	.080	.050	.100	.150
JUN	.	.300	.050	.050	.100	.100
JUL	.	.100	.100	1.100	.100	.100
AUG	.	.180	.100	.100	.	.
SEP	.	.200	.100	.100	.	.
OCT	.	.300	.100	.100	.100	.100
NOV	.	.330	.090	.090	.	.
DEC	.	.310	.100	.100	.	.
TOTAL CHLORINE (MG/L)			DET'N LIMIT = N/A		GUIDELINE =	N/A
FEB	.	.	.100	.100	.200	.200
MAR	.	.	.150	.100	.100	.200
APR	.	.	.100	.100	.	.150
MAY	.	.290	.050	.080	.200	.200
JUN	.	.300	.060	.060	.150	.150
JUL	.	.200	.100	1.100	.100	.150
AUG	.	.280	.100	.100	.100	.100
SEP	.	.350	.100	.100	.100	.100
OCT	.	.430	.100	.100	.150	.200
NOV	.	.500	.090	.090	.	.100
DEC	.	.420	.100	.100	.	.100
FLD PH (DMSNLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5 (A4)	
FEB	.	.	7.600	7.600	7.500	7.400
MAR	.	.	7.500	7.400	7.500	7.500
APR	.	.	7.500	7.500	7.400	7.500

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	8.000	7.600	7.600	7.500	7.600	7.400
JUN	7.500	7.600	7.500	7.500	7.500	7.400
JUL	8.000	7.500	7.500	7.500	7.600	7.500
AUG	7.900	7.500	7.550	7.550	7.500	7.500
SEP	7.900	7.500	7.580	7.500	7.500	7.550
OCT	7.900	7.500	7.500	7.550	7.620	7.580
NOV	7.900	7.800	7.600	7.550	7.600	7.650
DEC	7.900	7.700	7.550	7.550	7.500	7.500
TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE =	N/A
FEB	.	.	16.000	6.000	16.000	4.000
MAR	.	.	17.000	5.500	17.000	6.000
APR	.	.	17.000	8.600	16.000	8.000
MAY	14.000	14.000	19.000	12.200	18.000	14.000
JUN	21.700	21.500	23.700	17.000	23.000	19.000
JUL	27.000	24.000	26.500	20.500	26.000	23.000
AUG	25.100	25.000	26.800	21.500	25.100	23.900
SEP	18.000	20.000	22.000	19.800	20.000	20.000
OCT	14.000	13.000	17.300	16.300	18.000	16.000
NOV	10.000	11.000	18.800	12.100	2.000	12.800
DEC	6.000	11.000	17.000	10.000	19.000	10.200
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1.0	(A1)
FEB	.	.	.840	.740	.450	.540
MAR	.	.	.630	.830	.680	.380
APR	.	.	.650	.850	.370	.520
MAY	7.600	.180	.	.	.280	.340
JUN	7.200	.160	.430	.780	.530	.400
JUL	8.300	.090	.530	.760	.240	.490
AUG	6.400	.140	.440	.350	.280	.460
SEP	7.000	.240	.440	.630	.310	.380
OCT	5.800	.200	.570	.500	.230	.420
NOV	5.400	.310	.290	.550	.370	.510
DEC	8.100	.210	.480	.570	.360	.430

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = .200		GUIDELINE = 30-500 (A4)	
FEB	.	.	102.000	102.400	103.900	104.000
MAR	.	.	98.900	98.800	98.800	98.200
APR	.	.	97.100	96.300	97.600	97.400
MAY	108.700	102.900	101.400	101.800	103.100	103.100
JUN	103.600	97.600	99.000	97.900	98.600	97.900
JUL	99.800	94.000	94.200	93.500	93.600	93.900
AUG	97.100	92.500	102.500	93.000	94.000	96.600
SEP	99.600	96.400	94.900	94.200	95.900	96.000
OCT	103.500	97.300	97.900	97.800	99.100	98.600
NOV	105.400	100.200	101.600	100.800	101.100	100.600
DEC	106.700	102.100	102.300	101.400	102.100	101.900
CALCIUM (MG/L)			DET'N LIMIT = .100		GUIDELINE = 100. (F2)	
FEB	.	.	41.700	42.300	40.800	42.300
MAR	.	.	41.200	40.100	40.000	39.800
APR	.	.	39.300	39.300	38.700	40.100
MAY	41.000	41.800	41.200	41.000	41.400	41.600
JUN	38.000	38.200	39.400	39.000	39.200	38.600
JUL	37.000	37.600	37.400	38.000	37.800	38.000
AUG	36.000	36.200	39.600	37.000	37.200	36.200
SEP	38.000	37.800	38.200	38.200	38.400	38.200
OCT	38.800	38.600	39.200	38.400	38.800	39.200
NOV	38.200	40.000	39.400	39.400	39.800	39.800
DEC	39.200	38.200	38.000	38.400	38.200	36.400
CHLORIDE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 250.0 (A3)	
FEB	.	.	17.500	18.000	18.000	17.500
MAR	.	.	17.500	17.000	17.000	17.000
APR	.	.	17.500	17.500	17.500	17.500
MAY	16.500	17.000	17.500	17.500	17.500	17.500
JUN	15.500	16.500	17.000	17.000	16.000	16.000
JUL	15.500	16.500	16.500	16.000	16.500	16.500
AUG	16.000	17.000	17.500	17.000	17.000	17.000
SEP	16.500	17.500	17.500	17.500	18.000	18.000
OCT	15.600	17.200	16.900	16.900	17.000	16.700
NOV	15.600	16.800	16.900	16.700	16.700	16.900
DEC	16.000	17.200	16.700	16.700	16.800	16.900
COLOUR (TCU)			DET'N LIMIT = .5		GUIDELINE = 5.0 (A3)	
FEB	.	.	3.500	4.000	2.000 <T	3.000
MAR	.	.	3.000	4.000	2.000 <T	2.000 <T
APR	.	.	3.000	4.500	2.000 <T	2.500 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	3.500	3.000	5.000	4.500	1.000 <T	1.000 <T
JUN	1.000 <T	BDL	BDL	1.500 <T	1.000 <T	1.000 <T
JUL	2.000 <T	.500 <T	2.000 <T	3.000	1.000 <T	2.000 <T
AUG	2.500	1.000 <T	1.500 <T	2.000 <T	1.500 <T	2.500
SEP	3.000	1.500 <T	2.000 <T	3.000	2.000 <T	2.000 <T
OCT	2.000 <T	.500 <T	2.500	3.000	1.500 <T	2.500
NOV	2.000 <T	.500 <T	1.500 <T	2.000 <T	1.000 <T	1.500 <T
DEC	3.000	.500 <T	2.500	2.500	1.500 <T	2.000 <T
CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1		GUIDELINE = 400. (F2)		
FEB	.	.	323	324	326	325
MAR	.	.	325	324	324	323
APR	.	.	325	323	325	324
MAY	319	325	326	326	325	326
JUN	298	305	308	305	306	304
JUL	290	297	298	297	297	297
AUG	288	295	314	296	298	295
SEP	297	305	305	302	304	305
OCT	299	302	304	303	306	304
NOV	305	306	308	307	308	306
DEC	307	314	311	308	311	311
FLUORIDE (MG/L)		DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)		
FEB	.	.	.130	.110	.110	.110
MAR	.	.	.130	.120	.120	.120
APR	.	.	.140	.120	.130	.120
MAY	.090	.110	.110	.980 RVU	.950 RVU	.970 RVU
JUN	.130	.110	.120	.120	.120	.120
JUL	.150	.120	.130	.120	.120	.110
AUG	.130	.120	.110	.110	.110	.120
SEP	.120	.100	.100	.100	.100	.100
OCT	BDL	.120	.100	.100	.100	.100
NOV	.120	.100	.100	.080	.100	.100
DEC	.120	.120	.120	.100	.100	.100
HARDNESS (MG/L)		DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)		
FEB	.	.	143.500	144.500	141.000	144.500
MAR	.	.	140.000	136.500	136.500	136.000
APR	.	.	133.000	133.000	132.000	136.500
MAY	139.000	142.000	140.000	139.000	139.000	140.000
JUN	130.000	131.000	134.000	134.000	134.000	132.000
JUL	127.000	129.000	128.000	129.000	129.000	130.000
AUG	125.000	125.000	136.000	127.000	128.000	125.000
SEP	131.000	131.000	132.000	132.000	132.000	132.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	133.000	133.000	135.000	133.000	133.000	134.000
NOV	130.000	136.000	133.000	135.000	136.000	135.000
DEC	136.000	134.000	133.000	135.000	134.000	129.000
MAGNESIUM (MG/L)			DET'N LIMIT = .050		GUIDELINE = 30. (F2)	
FEB	.	.	9.550	9.500	9.500	9.450
MAR	.	.	9.000	8.800	8.900	8.800
APR	.	.	8.500	8.500	8.600	8.900
MAY	8.800	9.100	8.900	8.900	8.700	8.800
JUN	8.600	8.800	8.700	8.800	8.800	8.600
JUL	8.400	8.500	8.400	8.400	8.400	8.600
AUG	8.500	8.500	9.100	8.500	8.600	8.300
SEP	8.800	8.900	8.900	8.900	8.900	8.800
OCT	8.900	8.900	9.100	8.900	8.900	8.800
NOV	8.600	8.800	8.500	8.800	8.900	8.700
DEC	9.300	9.400	9.100	9.600	9.500	9.200
SODIUM (MG/L)			DET'N LIMIT = .200		GUIDELINE = 200. (C3)	
FEB	.	.	10.300	10.300	10.500	9.900
MAR	.	.	9.700	9.900	9.900	9.800
APR	.	.	10.500	10.400	11.300	10.300
MAY	10.000	10.400	10.200	10.000	10.000	10.000
JUN	9.200	9.400	9.000	8.600	9.200	9.000
JUL	8.800	8.800	8.800	8.800	8.800	8.800
AUG	8.800	9.000	9.000	9.000	9.400	9.000
SEP	10.000	9.800	9.800	9.800	10.000	10.000
OCT	9.400	9.400	9.600	9.400	9.400	9.400
NOV	9.000	9.000	8.800	9.200	9.200	8.800
DEC	9.400	10.200	9.400	9.600	9.400	9.600
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .05 (F2)	
FEB	.	.	.008 <T	.006 <T	.058	.006 <T
MAR	.	.	.012	.008 <T	.008 <T	.010
APR	.	.	.008 <T	.006 <T	.002 <T	.004 <T
MAY	BDL	.008 <T	.002 <T	.002 <T	BDL	.002 <T
JUN	.036	.012	.008 <T	.010	.008 <T	.012
JUL	.006 <T	.010	.002 <T	.002 <T	BDL	BDL
AUG	.014	.012	.306	BDL	BDL	BDL
SEP	.040	.014	.004 <T	.006 <T	.002 <T	.004 <T
OCT	.024	BDL	BDL	BDL	.002 <T	BDL
NOV	.022	BDL	.006 <T	.002 <T	.002 <T	.002 <T
DEC	.010	BDL	BDL	BDL	BDL	.002 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	.	.	.003 <T	.002 <T	.002 <T	.002 <T
MAR	.	.	.004 <T	.001 <T	.005	.004 <T
APR	.	.	.002 <T	.002 <T	.002 <T	.001 <T
MAY	.052	BDL	.001 <T	.001 <T	BDL	BDL
JUN	.020	.001 <T	.002 <T	.002 <T	.002 <T	.002 <T
JUL	.041	.002 <T	.002 <T	.001 <T	.001 <T	.001 <T
AUG	.025	BDL	BDL	BDL	BDL	BDL
SEP	.014	.003 <T	.003 <T	.003 <T	.003 <T	.003 <T
OCT	.003 <T	.001 <T	.002 <T	.001 <T	.003 <T	.002 <T
NOV	.004 <T	BDL	.002 <T	.001 <T	.001 <T	.001 <T
DEC	.005	BDL	BDL	BDL	BDL	BDL
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)	
FEB	.	.	.315	.325	.330	.325
MAR	.	.	.305	.290	.300	.300
APR	.	.	.330	.305	.325	.305
MAY	.370	.305	.330	.315	.325	.330
JUN	.185	.165	.210	.180	.190	.175
JUL	.150	.105	.150	.110	.110	.110
AUG	.105	.075 <T	.030 <T	.070 <T	.095 <T	.080 <T
SEP	.135	.135	.165	.135	.150	.140
OCT	.110	.115	.135	.115	.140	.120
NOV	.195	.195	.210	.195	.205	.195
DEC	.200	.200	.215	.195	.205	.205
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020		GUIDELINE = N/A	
FEB	.	.	.130	.230	.350	.160
MAR	.	.	.220	.190	.150	.210
APR	.	.	.130	.130	.130	.140
MAY	.210	.170	.110	.110	.110	.120
JUN	.180	.130	.140	.140	.140	.120
JUL	.210	.140	.110	.110	.090 <T	.140
AUG	.180	.150	.480	.140	.120	.130
SEP	.200	.180	.150	.170	.180	.150
OCT	.220	.130	.140	.130	.130	.140
NOV	.230	.170	.180	.170	.160	.170
DEC	.220	.190	.150	.160	.170	.150
PH (DMSNLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
FEB	.	.	7.850	7.840	7.910	7.900
MAR	.	.	8.150	8.120	8.230	8.170
APR	.	.	8.040	8.040	8.050	8.050
MAY	8.370	8.220	8.180	8.180	8.200	8.190
JUN	8.420	8.190	8.210	8.180	8.180	8.200

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	8.400	8.080	8.070	8.050	8.040	8.040
AUG	8.340	8.040	7.990	8.050	8.040	8.030
SEP	8.340	8.220	8.230	8.200	8.210	8.230
OCT	8.330	8.110	8.130	8.120	8.140	8.110
NOV	8.310	8.240	8.220	8.240	8.230	8.210
DEC	8.380	8.360	8.350	8.280	8.340	8.320
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = .5UG/L		GUIDELINE = N/A		
MAY	.009	.000 <T	.	.	.	.
JUN	.006	.000 <T	.	.	.	.
JUL	.005	.000 <T	.	.	.	.
AUG	.005	.001 <T	.	.	.	.
SEP	.005	.000 <T	.	.	.	.
OCT	.002 <T	BDL	.	.	.	.
NOV	.002	.001 <T	.	.	.	.
DEC	.007	.003	.	.	.	.
PHOSPHORUS TTL-UNFIL (MG/L)		DET'N LIMIT = .002		GUIDELINE = .40 (F2)		
MAY	.019	.004 <T	.	.	.	.
JUN	.012	BDL	.	.	.	.
JUL	.017	.002 <T	.	.	.	.
AUG	.015	BDL	.	.	.	.
SEP	.013	.002 <T	.	.	.	.
OCT	.012	.002 <T	.	.	.	.
NOV	.010	BDL	.	.	.	.
DEC	.016	.003 <T	.	.	.	.
RESIDUE (TOTAL) (MG/L)		DET'N LIMIT = 1.		GUIDELINE = 500. (A3)		
FEB	.	.	210 CRO	211 CRO	212 CRO	211 CRO
MAR	.	.	211 CRO	211 CRO	211 CRO	210 CRO
APR	.	.	211 CRO	210 CRO	211 CRO	211 CRO
MAY	207 CRO	211 CRO	212 CRO	212 CRO	211 CRO	212 CRO
JUN	194 CRO	198 CRO	200 CRO	198 CRO	199 CRO	198 CRO
JUL	189 CRO	193 CRO	194 CRO	193 CRO	193 CRO	193 CRO
AUG	187 CRO	192 CRO	204 CRO	192 CRO	194 CRO	192 CRO
SEP	193 CRO	198 CRO	198 CRO	196 CRO	198 CRO	198 CRO
OCT	194 CRO	196 CRO	198 CRO	197 CRO	199 CRO	198 CRO
NOV	198 CRO	199 CRO	200 CRO	200 CRO	200 CRO	199 CRO
DEC	200 CRO	205 CRO	202 CRO	200 CRO	202 CRO	202 CRO
TURBIDITY (FTU)		DET'N LIMIT = .02		GUIDELINE = 1.00 (A1)		
FEB	.	.	.550	.450	.390	.300
MAR	.	.	.360	.460	.150	.180

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	.	.	.360	.500	.170	.250
MAY	6.000	.240	1.030	1.170	.150	.220
JUN	5.300	.180	.250	.440	.320	.260
JUL	11.600	.090	.350	.540	.170	.360
AUG	7.900	.180	.360	.230	.240	.440
SEP	8.300	.120	.330	.420	.210	.240
OCT	6.200	.030 <T	.310	.270	.130	.260
NOV	5.600	.130	.180	.140	.110	.110
DEC	9.600	.220	.270	.270	.140	.180

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (MG/L)			DET'N LIMIT = .004		GUIDELINE = .10 (A4)	
FEB	.	.	.023	!IS	.033	.025
MAR	.	.	.038	.043	.039	.033
APR	.	.	.046	.053	!IS	.059
MAY	.270	.120	.075	.083	.092	.110
JUN	.200	.150	.091	.110	.150	.110
JUL	.160	.210	.110	.130	.140	.130
AUG	.180	.370	.096	.130	.210	.230
SEP	.200	.150	!RE	.091	.092	.099
OCT	.160	.110	.078	.076	.083	.120
NOV	.130	.130	.110	.110	.120	.110
DEC	.180	.061	.059	.056	.055	!IS
BARIUM (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)	
FEB	.	.	.019	!IS	.020	.020
MAR	.	.	.021	.019	.021	.019
APR	.	.	.020	.018	!IS	.018
MAY	.021	.019	.020	.019	.020	.020
JUN	.022	.020	.022	.020	.021	.021
JUL	.025	.024	.026	.024	.026	.024
AUG	.023	.022	.028	.028	.021	.022
SEP	.017	.016	!RE	.016	.016	.016
OCT	.018	.017	.017	.017	.018	.017
NOV	.018	.017	.020	.017	.018	.017
DEC	.018	.017	.017	.016	.017	!IS
BORON (MG/L)			DET'N LIMIT = 0.01		GUIDELINE = 5.000 (A1)	
FEB	.	.	.030	!IS	.030	.030
MAR	.	.	BDL	.020	.030	.020
APR	.	.	.020	.020	.030	.030
MAY	.030 <T	.020 <T	.030 <T	.020 <T	.030 <T	.030 <T
JUN	.040	.040	.020	.030	.030	.030
JUL	.020 <T	.020 <T	.020 <T	.030 <T	.020 <T	.010 <T
AUG	.020 <T	.020 <T	.040 <T	.030 <T	.030 <T	.030 <T
SEP	.020 <T	.020 <T	!RE	.020 <T	.020 <T	.010 <T
OCT	.030 <T	.040 <T	.030 <T	.030 <T	.030 <T	.030 <T
NOV	.020 <T	.030 <T	.030 <T	.030 <T	.030 <T	.020 <T
DEC	.032 <T	.027 <T	.024 <T	.014 <T	.028 <T	.034 <T
CADMIUM (UG/L)			DET'N LIMIT = 0.300		GUIDELINE = 5.000 (A1)	
FEB	.	.	BDL	!IS	BDL	BDL
MAR	.	.	BDL	BDL	BDL	BDL
APR	.	.	BDL	BDL	!IS	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	4.000	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	.300	BDL
SEP	BDL	BDL	!RE	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	.700
DEC	BDL	BDL	BDL	BDL	BDL	!IS
COBALT (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.0 (H)	
FEB	.	.	BDL	!IS	BDL	BDL
MAR	.	.	BDL	BDL	BDL	BDL
APR	.	.	BDL	BDL	!IS	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	.002	.002	.001	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	!RE	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	!IS
CHROMIUM (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .05 (A1)	
FEB	.	.	BDL	!IS	BDL	BDL
MAR	.	.	BDL	BDL	BDL	BDL
APR	.	.	BDL	BDL	!IS	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	.001	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	.001	BDL
AUG	.001	.001	.001	BDL	BDL	BDL
SEP	BDL	BDL	!RE	BDL	.002	BDL
OCT	.003	.002	.002	.001	.001	.002
NOV	.002	.002	.002	.002	.002	.001
DEC	.002	.002	.002	.002	.001	!IS
COPPER (MG/L)			DET'N LIMIT = .001		GUIDELINE = 1.0 (A3)	
FEB	.	.	.023	!IS	.030	.002
MAR	.	.	.028	.004	.009	.002
APR	.	.	.016	.003	!IS	.003
MAY	.003	BDL	.017	.003	.076	.002
JUN	.007	BDL	.012	.002	.004	.002
JUL	.005	BDL	.015	.002	.005	.002
AUG	.004	.001	.043	BDL	.004	.003
SEP	.006	.001	!RE	.003	.004	.002

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	.005	.001	.012	.003	.005	.002
NOV	.006	.002	.014	.003	.005	.002
DEC	.005	BDL	.016	.002	.009	!IS
IRON (MG/L)			DET'N LIMIT = .002		GUIDELINE = .300 (A3)	
FEB	.	.	.140	!IS	.054	.070
MAR	.	.	.120	.150	.039	.058
APR	.	.	.093	.130	!IS	.066
MAY	.320	BDL	.190	.210	.028	.047
JUN	.280	BDL	.023	.085	.110	.170
JUL	.260	BDL	.070	.120	.030	.066
AUG	.230	.012	.041	BDL	.031	.068
SEP	.190	.003	!RE	.070	.039	.050
OCT	.180	BDL	.083	.079	.029	.058
NOV	.130	.004	.040	.050	.028	.070
DEC	.230	.007	.075	.089	.038	!IS
MERCURY (UG/L)			DET'N LIMIT = 0.010		GUIDELINE = 1.000 (A1)	
FEB	.	.	.	.010	.	.010
MAR	.	.	.	BDL	.	BDL
APR	.	.	.	.010	.	.020
MAY	.040	BDL	.	.020	.	BDL
JUN	BDL	BDL	.	.020	.	.010
JUL	.020	.040	.	.020	.	.020
AUG	.010	.010	.	.040	.	.050
SEP	.010	.040	.	.040	.	.020
OCT	.010	.010	.	.030	.	.030
NOV	.010	.010	.	.040	.	BDL
DEC	.020	.010	.	.040	.	.010
MANGANESE (MG/L)			DET'N LIMIT = .001		GUIDELINE = .050 (A3)	
FEB	.	.	.005	!IS	.002	.003
MAR	.	.	.005	.006	.003	.003
APR	.	.	.005	.005	!IS	.003
MAY	.013	.001	.006	.007	.003	.003
JUN	.010	.001	.003	.003	.003	.003
JUL	.014	.002	.004	.005	.003	.004
AUG	.011	.001	.130	.019	.001	.003
SEP	.008	.001	!RE	.004	.002	.002
OCT	.010	.001	.004	.004	.002	.003
NOV	.007	.002	.003	.003	.002	.002
DEC	.009	.002	.005	.005	.003	!IS
MOLYBDENUM (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .50 (H)	

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE						
			STANDING	FREE FLOW	STANDING	FREE FLOW
FEB	.	.	BDL	!IS	.001	.001
MAR	.	.	BDL	BDL	.001	.001
APR	.	.	BDL	BDL	!IS	BDL
MAY	BDL	.001	BDL	.001	.001	.001
JUN	BDL	.001	.001	.001	BDL	BDL
JUL	BDL	.001	.001	.001	.001	.001
AUG	BDL	.001	BDL	BDL	BDL	.001
SEP	BDL	.001	!RE	.001	BDL	BDL
OCT	.001	.001	BDL	BDL	BDL	BDL
NOV	BDL	.001	BDL	BDL	BDL	BDL
DEC	BDL	.001	.002	BDL	.001	!IS
NICKEL (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .05 (F3)	
FEB	.	.	BDL	!IS	.007	BDL
MAR	.	.	.004	.002	.002	BDL
APR	.	.	.002	BDL	!IS	.002
MAY	.002	BDL	.002	BDL	.002	BDL
JUN	.002	BDL	.003	.002	.002	BDL
JUL	BDL	.002	BDL	BDL	.002	.002
AUG	BDL	BDL	BDL	BDL	.002	.002
SEP	BDL	BDL	!RE	.003	BDL	BDL
OCT	.002	.002	.002	.002	.002	.002
NOV	.002	.002	.002	.002	.002	BDL
DEC	.002	.002	.002	.002	.004	!IS
LEAD (MG/L)			DET'N LIMIT = 0.003		GUIDELINE = .050 (A1)	
FEB	.	.	.004	!IS	.005	.004
MAR	.	.	.005	.003	.004	.004
APR	.	.	BDL	BDL	!IS	.006
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	.016	.012	.007	.005	.005
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	!RE	BDL	BDL	BDL
OCT	BDL	BDL	BDL	.003	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	!IS
STRONTIUM (MG/L)			DET'N LIMIT = .001		GUIDELINE = 2.00 (H)	
FEB	.	.	.180	!IS	.190	.180
MAR	.	.	.180	.180	.180	.170
APR	.	.	.170	.160	!IS	.160
MAY	.180	.170	.180	.190	.190	.190
JUN	.160	.160	.160	.160	.160	.160

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
JUL	.180	.180	.190	.180	.190	.190
AUG	.160	.160	.170	.200	.160	.160
SEP	.130	.140	!RE	.140	.140	.140
OCT	.150	.150	.150	.150	.150	.150
NOV	.160	.150	.170	.160	.160	.160
DEC	.160	.160	.160	.160	.160	!IS
URANIUM (UG/L)			DET'N LIMIT = .02		GUIDELINE = 20. (A2)	
FEB	.	.	.240	!IS	.320	.280
MAR	.	.	.220	.210	.230	.220
APR	.	.	.210	.220	.290	.240
MAY	.430	.330	.370	.340	.360	.330
JUN	.020	.220	.220	.220	.230	.210
JUL	.330	.240	.250	.240	.250	.250
AUG	.030	.020	.020	.030	.020	.010
SEP	.420	.310	!RE	.260	.280	.300
OCT	.450	.360	.330	.310	.350	.350
NOV	.380	.360	.360	.350	.360	.340
DEC	.400	.300	.300	.300	.300	.300
VANADIUM (MG/L)			DET'N LIMIT = .001		GUIDELINE = .10 (H)	
FEB	.	.	BDL	!IS	BDL	BDL
MAR	.	.	BDL	BDL	.001	.001
APR	.	.	BDL	BDL	!IS	BDL
MAY	.001	.001	.001	BDL	BDL	BDL
JUN	.001	BDL	.001	BDL	BDL	.001
JUL	BDL	BDL	.001	.001	BDL	BDL
AUG	.001	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	!RE	BDL	BDL	BDL
OCT	.001	BDL	BDL	BDL	BDL	BDL
NOV	.001	BDL	BDL	BDL	.002	.001
DEC	BDL	BDL	BDL	.002	BDL	!IS
ZINC (MG/L)			DET'N LIMIT = .001		GUIDELINE = 5.00 (A3)	
FEB	.	.	.015	!IS	.020	.001
MAR	.	.	.014	.002	.007	.001
APR	.	.	.007	.001	!IS	.002
MAY	.005	.001	.009	.001	.034	.005
JUN	.006	BDL	.006	BDL	BDL	BDL
JUL	.007	.002	.013	.004	.008	.003
AUG	.006	.003	.014	BDL	.003	.001
SEP	.006	.001	!RE	BDL	.002	.001
OCT	.006	.002	.009	BDL	.005	.003
NOV	.007	BDL	.007	BDL	.004	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

SITE TYPE	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DEC	.004	BDL	.007	.001	.016	!IS

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900. (D4)		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	BDL
APR	.	.	.	BDL	.	BDL
MAY	9.000 <T	7.000 <T	.	BDL	.	4.000 <T
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	1.000 <T
AUG	BDL	BDL	.	BDL	.	3.000 <T
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
245 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	BDL
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	5.000 <T	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE				SITE 2		
TYPE	RAW	TREATED	SITE 1 STANDING	SITE 1 FREE FLOW	SITE 2 STANDING	SITE 2 FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700. (G)		
FEB	.	.	.	2.000 <T	.	BDL
MAR	.	.	.	1.000 <T	.	2.000 <T
APR	.	.	.	1.000 <T	.	1.000 <T
MAY	2.000 <T	1.000 <T	.	2.000 <T	.	1.000 <T
JUN	2.000 <T	BDL	.	1.000 <T	.	2.000 <T
JUL	BDL	2.000 <T	.	BDL	.	2.000 <T
AUG	1.000 <T	3.000 <T	.	1.000 <T	.	1.000 <T
SEP	BDL	BDL	.	BDL	.	BDL
OCT	2.000 <T	1.000 <T	.	BDL	.	1.000 <T
NOV	BDL	BDL	.	BDL	.	BDL
DEC	1.000 <T	1.000 <T	.	2.000 <T	.	1.000 <T
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000.0 (A1)		
FEB	.	.	.	1.000 <T	.	BDL
MAR	.	.	.	1.000 <T	.	BDL
APR	.	.	.	BDL	.	BDL
MAY	1.000 <T	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
	PHENOLICS					
PHENOL (UG/L)			DET'N LIMIT = 0.2		GUIDELINE = 2.00 (A3)	
MAY	.400 <T	.400 <T	.	.	.	.
JUN	BDL	.200 <T	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	.200 <T	BDL	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
SPECIFIC PESTICIDES						
ATRAZINE (NG/L)			DET'N LIMIT = 50.00		GUIDELINE = 60000. (B3)	
FEB	.	.	.	BDL	.	130.000 <T
MAR	.	.	.	60.000 <T	.	60.000 <T
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	!PE	!PE	.	!PE	.	!PE
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
TOLUENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 100.0 (G)		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	.
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	.	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	.400 <T	.	.950	.	.100 <T
OCT	BDL	.350 <T	.	.150 UCS	.	.100 UCS
NOV	BDL	.100 <T	.	BDL	.	.100 <T
DEC	BDL	BDL	.	BDL	.	BDL
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 3400. (D3)		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	.
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	.	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.200 <T	.	BDL
SEP	BDL	.150 <T	.	BDL	.	.050 <T
OCT	BDL	BDL	.	BDL	.	BDL
NOV	.050 <T	.050 <T	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)		
FEB	.	.	.	6.000	.	7.000
MAR	.	.	.	8.000	.	.
APR	.	.	.	10.000	.	12.000
MAY	BDL	12.000	.	12.000	.	12.000
JUN	BDL	10.900	.	9.400	.	10.200
JUL	.	9.000	.	10.000	.	12.000
AUG	BDL	11.200	.	9.900	.	11.500
SEP	BDL	10.500	.	10.000	.	13.400
OCT	BDL	20.300	.	11.900	.	12.500
NOV	BDL	21.400	.	14.700	.	11.500
DEC	BDL	20.800	.	11.900	.	11.800
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)		
FEB	.	.	.	6.000	.	6.000
MAR	.	.	.	6.000	.	.
APR	.	.	.	7.000	.	7.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE			SITE 1		SITE 2	
TYPE	RAW	TREATED	STANDING	FREE FLOW	STANDING	FREE FLOW
MAY	BDL	7.000	.	7.000	.	7.000
JUN	BDL	6.600	.	6.100	.	6.200
JUL	.	5.000	.	6.000	.	7.000
AUG	BDL	7.300	.	6.400	.	6.800
SEP	BDL	7.700	.	7.100	.	8.900
OCT	BDL	11.700	.	8.300	.	8.500
NOV	BDL	13.200	.	10.200	.	8.000
DEC	BDL	13.400	.	8.900	.	7.500
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)		
FEB	.	.	.	3.000	.	3.000
MAR	.	.	.	3.000	.	.
APR	.	.	.	3.000	.	3.000
MAY	BDL	4.000	.	3.000	.	3.000
JUN	BDL	3.000	.	3.100	.	3.300
JUL	.	2.000	.	3.000	.	3.000
AUG	BDL	3.600	.	3.600	.	3.400
SEP	BDL	3.100	.	3.200	.	3.700
OCT	BDL	4.400	.	3.400	.	3.100
NOV	BDL	5.000	.	4.200	.	3.300
DEC	BDL	5.900	.	4.100	.	3.500
BROMOFORM (UG/L)			DET'N LIMIT = 0	GUIDELINE = 350.0 (A1+)		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	.
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	.	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	.200 <T	.	BDL
SEP	BDL	.200 <T	.	.400 <T	.	.400 <T
OCT	BDL	.200 <T	.	.200 <T	.	BDL
NOV	BDL	.200 <T	.	.400 <T	.	.200 <T
DEC	BDL	BDL	.	BDL	.	BDL
1,4 DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0	GUIDELINE = 75.0 (D1)		
FEB	.	.	.	BDL	.	BDL
MAR	.	.	.	BDL	.	.
APR	.	.	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	.	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	.100 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
SITE						
	RAW	TREATED	SITE 1		SITE 2	
TYPE			STANDING	FREE FLOW	STANDING	FREE FLOW
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0		GUIDELINE = 350.0 (A1)	
FEB	.	.	.	15.000	.	16.000
MAR	.	.	.	17.000	.	.
APR	.	.	.	19.000	.	22.000
MAY	BDL	23.000	.	22.000	.	22.000
JUN	BDL	20.500	.	18.600	.	19.700
JUL	.	16.000	.	19.000	.	22.000
AUG	BDL	22.100	.	20.100	.	21.700
SEP	BDL	21.500	.	20.700	.	26.400
OCT	BDL	36.600	.	23.800	.	24.100
NOV	BDL	39.800	.	29.500	.	23.000
DEC	BDL	40.100	.	24.900	.	22.800

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE		
CHEMISTRY (LAB)	CYANIDE	38	0.001	.200	(A1)	MG/L
METALS	ARSENIC	60	0.001	.050	(A1)	MG/L
	BERYLLIUM	60	0.001	.0002	(H)	MG/L
	CYANIDE	38	0.001	.200	(A1)	MG/L
	SELENIUM	60	0.001	.010	(A1)	MG/L
CHLOROAROMATICS	HEXACHLOROBUTADIENE	38	1.000	450.	(D4)	NG/L
	123 TRICHLOROBENZENE	38	5.000	10000.	(I)	NG/L
	1234 T-CHLOROBENZENE	38	1.000	10000.	(I)	NG/L
	1235 T-CHLOROBENZENE	38	1.000	10000.	(I)	NG/L
	124 TRICHLOROBENZENE	38	5.000	10000.	(I)	NG/L
	1245 T-CHLOROBENZENE	38	1.000	38000.	(D4)	NG/L
	135 TRICHLOROBENZENE	38	5.000	10000.	(D4)	NG/L
	OCTACHLOROSTYRENE	38	1.000		N/A	NG/L
	PENTACHLOROBENZENE	38	1.000	74000.	(D4)	NG/L
	236 TRICHLOROTOLUENE	38	5.000		N/A	NG/L
	26A TRICHLOROTOLUENE	38	5.000		N/A	NG/L
CHLOROPHENOLS	234 TRICHLOROPHENOL	4	50.		N/A	NG/L
	2345 T-CHLOROPHENOL	4	50.		N/A	NG/L
	2356 T-CHLOROPHENOL	4	50.		N/A	NG/L
	245-TRICHLOROPHENOL	4	50.	2600000	(D4)	NG/L
	246-TRICHLOROPHENOL	4	50.	10000.	(C1)	NG/L
	PENTACHLOROPHENOL	4	50.	10000.	(C1)	NG/L
PAH	PHENANTHRENE	8	0		N/A	NG/L
	ANTHRACENE	8	0		N/A	NG/L
	FLUORANTHENE	8	0	42000	(D4)	NG/L
	PYRENE	8	0		N/A	NG/L
	BENZO(A)ANTHRACENE	8	0		N/A	NG/L
	CHRYSENE	8	0		N/A	NG/L
	DIMETH. BENZ(A)ANTHR	8	0		N/A	NG/L
	BENZO(E)PYRENE	8	0		N/A	NG/L
	BENZO(J) FLUORANTHEN	8	N/A		N/A	NG/L
	BENZO(B) FLUORANTHEN	8	0		N/A	NG/L
	PERYLENE	8	0		N/A	NG/L
	BENZO(K) FLUORANTHEN	8	N/A		N/A	NG/L
	BENZO (A) PYRENE	8	0	10	(B1)	NG/L
	BENZO(G,H,I) PERYLEN	8	0		N/A	NG/L
	DIBENZO(A,H) ANTHRAC	8	0		N/A	NG/L
	INDENO(1,2,3-C,D) PY	8	0		N/A	NG/L
	BENZO(B) CHRYSENE	8	0		N/A	NG/L
	ANTHANTHRENE	8	N/A		N/A	NG/L
	CORONENE	8	0		N/A	NG/L
PESTICIDES & PCB	ALDRIN	38	1.000	700.0	(A1)	NG/L
	BETA BHC	38	1.000	300.	(G)	NG/L
	ALPHA CHLORDANE	38	2.000	7000.0	(A1)	NG/L
	GAMMA CHLORDANE	38	2.000	7000.0	(A1)	NG/L
	DIELDRIN	38	2.000	700.0	(A1)	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
PESTICIDES & PCB	METHOXYCHLOR	38	5.000	100000.(A1)	NG/L
	THIODAN I	38	2.000	74000. (D4)	NG/L
	THIODAN II	38	4.000	74000. (D4)	NG/L
	ENDRIN	38	4.000	200.0 (A1)	NG/L
	THIODAN SULPHATE	38	4.000	N/A	NG/L
	HEPTACHLOR EPOXIDE	38	1.000	3000.0 (A1)	NG/L
	HEPTACHLOR	38	1.000	3000.0 (A1)	NG/L
	MIREX	38	5.000	N/A	NG/L
	OXYCHLORDANE	38	2.000	N/A	NG/L
	OPDDT	38	5.000	30000. (A1)	NG/L
	PCB	38	20.000	3000. (A2)	NG/L
	PP-DDD	38	5.000	N/A	NG/L
	PPDDE	38	1.000	30000. (A1)	NG/L
	PPDDT	38	5.000	30000. (A1)	NG/L
	ATRATONE	38	50.	N/A	NG/L
	ALACHLOR	38	500.	35000. (D2)	NG/L
	ETHYLENE DIBROMIDE	36	0	50.0 (G)	UG/L
	HCB	38	1.000	10.0 (C1)	NG/L
SPECIFIC PESTICIDES	TOXAPHENE	38	N/A	5000. (A1)	NG/L
	AMETRYNE	38	50.00	300000.(D3)	NG/L
	BLADEX	38	100.00	10000. (B3)	NG/L
	PROMETONE	38	50.00	52500. (D3)	NG/L
	PROPAZINE	38	50.00	16000. (D2)	NG/L
	PROMETRYNE	38	50.00	1000. (B3)	NG/L
	SENCOR	38	100.00	80000. (B2)	NG/L
	SIMAZINE	38	50.00	10000. (B3)	NG/L
	2,4,5-T	4	50.00	35000. (D2)	NG/L
	2,4-D	4	100.00	100000.(A1)	NG/L
	24DCHLRPHENOXYBUTYRC	4	200.00	18000. (B3)	NG/L
	2,4-DP	4	100.00	N/A	NG/L
	DICAMBA	4	100.00	87000. (B3)	NG/L
	PICHLORAM	4	100.00	2450000(D3)	NG/L
	SILVEX	4	50.00	10000. (A1)	NG/L
	DIAZINON	4	20.	14000. (A1)	NG/L
	DICHLOROVOS	4	20.	N/A	NG/L
	DURSBAN	4	20.	N/A	NG/L
	ETHION	4	20.	35000. (G)	NG/L
	GUTHION	4	N/A	N/A	NG/L
	MALATHION	4	20.	160000. (G)	NG/L
	MEVINPHOS	4	20.	N/A	NG/L
	METHYL PARATHION	4	50.	7000. (B3)	NG/L
	METHYLTRITHION	4	20.	N/A	NG/L
	PARATHION	4	20.	35000. (B1)	NG/L
	PHORATE	4	20.	35.0 (D2)	NG/L
	RELDAN	4	20.	N/A	NG/L
	RONNEL	4	20.	N/A	NG/L
	AMINOCARB	4	N/A	N/A	NG/L
	BENOMYL	4	N/A	N/A	NG/L
	BUX	4	2000.	N/A	NG/L
	CARBOFURAN	4	2000.	18000. (D3)	NG/L
	CIPC	4	2000.	350000. (G)	NG/L

TABLE 6

DRINKING WATER SURVEILLANCE PROGRAM ST. CATHARINES WATER TREATMENT PLANT 1987

COUNT OF PARAMETERS NOT FOUND ABOVE THE DETECTION LIMIT

SCAN	PARAMETER	ANALYSED	DETECTION LIMIT	GUIDELINE	
SPECIFIC PESTICIDES	DIALLATE	4	2000.	30000. (H)	NG/L
	EPTAM	4	2000.	N/A	NG/L
	IPC	4	2000.	N/A	NG/L
	PROPOXUR	4	2000.	90000. (G)	NG/L
	SEVIN	4	200.	70000. (A1)	NG/L
	SUTAN	4	2000.	245000.(D3)	NG/L
	METOLACHLOR	38	500.	50000. (B3)	NG/L
VOLATILES	BENZENE	36	0	5.0 (D1)	UG/L
	P-XYLENE	36	0	620. (G)	UG/L
	M-XYLENE	36	0	620. (G)	UG/L
	O-XYLENE	36	0	620. (G)	UG/L
	1,1 DICHLOROETHYLENE	36	0	7.0 (D1)	UG/L
	DICHLOROMETHANE	36	0	1750. (D3)	UG/L
	T1,2DICHLOROETHYLENE	36	0	350. (D3)	UG/L
	1,1 DICHLOROETHANE	36	0	N/A	UG/L
	111, TRICHLOROETHANE	36	0	200. (D1)	UG/L
	1,2 DICHLOROETHANE	36	0	5.0 (D1)	UG/L
	CARBON TETRACHLORIDE	36	0	5.0 (D1)	UG/L
	1,2 DICHLOROPROPANE	36	0	10.0 (G)	UG/L
	TRICHLOROETHYLENE	36	0	5.0 (D1)	UG/L
	112 TRICHLOROETHANE	36	0	.60 (D4)	UG/L
	T-CHLOROETHYLENE	36	0	10.0 (C2)	UG/L
	1122 T-CHLOROETHANE	36	0	0.17 (D4)	UG/L
	CHLOROBENZENE	36	0	1510. (D3)	UG/L
	1,3 DICHLOROBENZENE	36	0	130. (G)	UG/L
	1,2 DICHLOROBENZENE	36	0	130. (G)	UG/L
	TRIFLUOROCHLOROTOLUE	36	0	N/A	UG/L
	ETHYLENE DIBROMIDE	36	0	50.0 (G)	UG/L

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario; currently 44 plants are being monitored. Water supply locations have been prioritized for surveillance, based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data, in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details, and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant, and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and initial plant visit. During the initial assessment of the plant and distribution system the questionnaire content is verified and

missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes that the water is subjected to, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow as well as a record of the flow rate on the day of sampling are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling of bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity) and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free,combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for approximately 160 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments parameters may be measured for in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis however, those that are technically more difficult and/or costly to analyse for are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information

This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in fig. 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs, Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function, therefore anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication, Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines which are documented in the Parameter Reference Information may be used. If these guidelines are exceeded the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

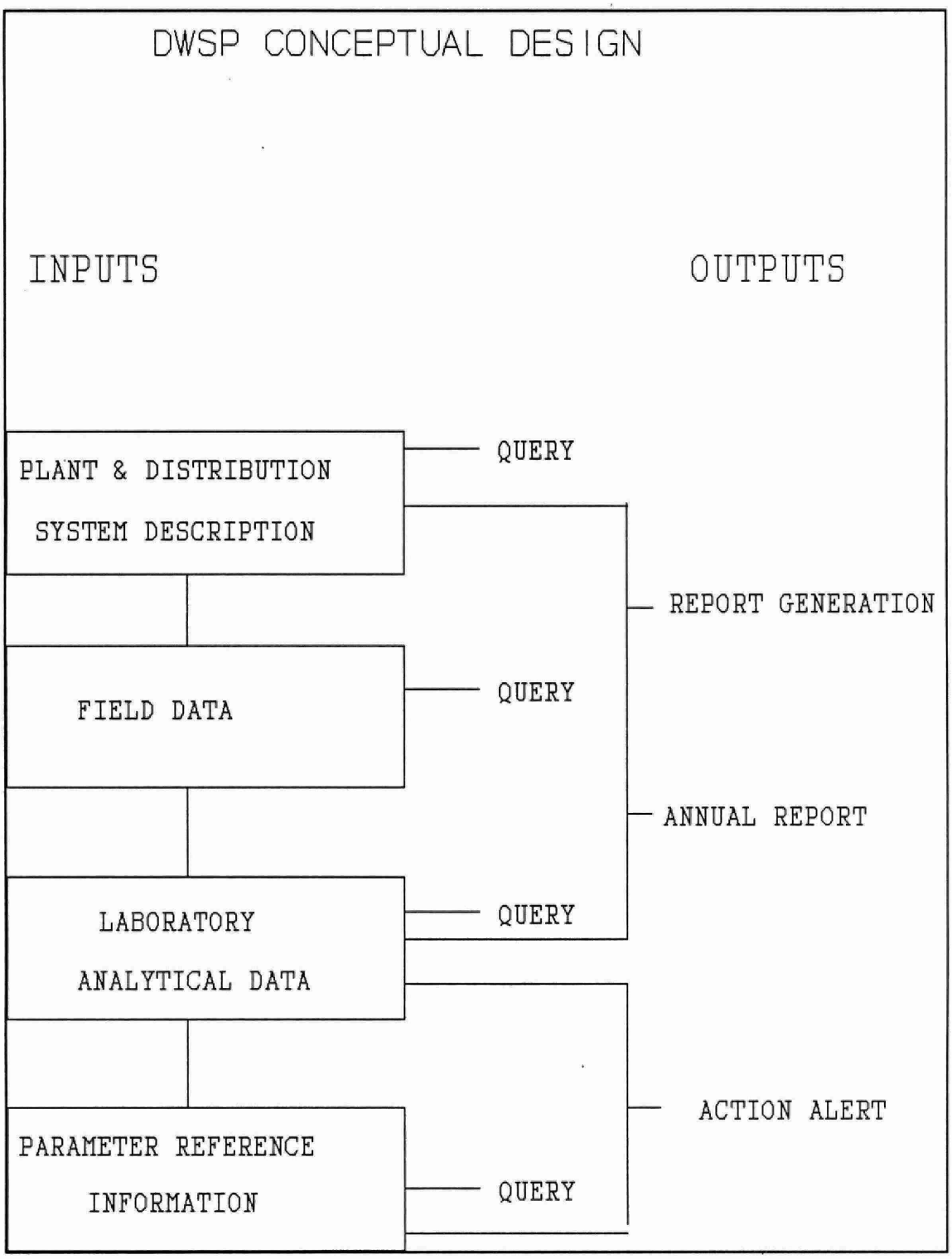

DWSP CONCEPTUAL DESIGN
INPUTS
OUTPUTS
PLANT & DISTRIBUTION SYSTEM DESCRIPTION
FIELD DATA
LABORATORY ANALYTICAL DATA
PARAMETER REFERENCE INFORMATION
QUERY
QUERY
QUERY
QUERY
REPORT GENERATION
ANNUAL REPORT
ACTION ALERT

FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P) PARAMETER
REFERENCE
BENZENE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA C	86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA C	80/11		NOMETH	6.60	063000 UG/L	
FERC C	84/05		NOMETH	1.00	063000 UG/L	
WHO C	84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE
CAS#: 71432
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L
SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27), CYCLOHEXATRIENE (41)
CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:
SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)
THRESHOLD ODOUR: NO DATA
THRESHOLD TASTE: 0.5 MG/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMUALTE IN LIVING ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL QUANITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY
SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL TAR DISTILLATION, FOOD PROCESSING, TANNING.
USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY, DEGREASING AND CLEANSING AGENT, GASOLINE.
TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES MUCOUS MEMBRANES, SYMPTONS INCLUDE RESTLESSNESS, CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE; CHRONIC - ANEMIA AND LEUKEMIA (45).
CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN
REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM FOLLOWED BY SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).
MOLECULAR WEIGHT: 78.12 GRAMS
MELTING POINT: 5.5 DEGREES C (27)
BOILING POINT: 80.1 DEGREES C (27)
SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)
VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C
HENRY'S LAW CONSTANT: 0.00555 ATM M_3/MOLE
LOG OCT./WATER PAR.COEFF: K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC),(OWTRI),(OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)

Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and $KCrO_7$ corrosive)
Phenols	-250 mL clear glass bottle -do <u>not</u> rinse bottle -fill to top of label as marked

<u>Steps</u>

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear palstic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)

Steps:

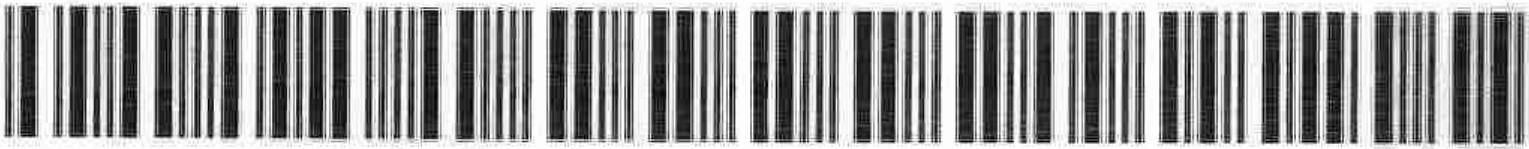
1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC), (OWTRI)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and KCrO7 corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for ten minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), tubidity and pH on submission sheet.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